



WACHENDORFF

Prozesstechnik GmbH & Co. KG

UR4848x Controller User manual

Version 1.0



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Introduction

Dear valued Customer! Thank you for purchasing and using a product from our company. The compact universal controller UR4848 integrates in a single device all options for sensor reading and actuators command, beside extended supply range 24 to 230 Vac/Vdc. Thanks to 18 selectable sensors and outputs configurable as relay, SSR command, 4 to 20 mA and 0 to10 Volt the user can reduce stock needs.

The series includes also a model with serial communication RS485 Modbus RTU and with a loading control function via the amperometric transformer. The possibility to repeat parametrization is simplified by the programming module with internal battery that do not require power supply for the controller

For getting the highest effort out of this unit, we kindly ask you to follow the below mentioned instructions:

Every person who is involved with the installation or usage of this unit, must read carefully and understand the installation manual and safety instructions!

1 Safety instructions

1.1 General instructions



To ensure the safe operation of this unit the instructions that appear in this manual must be strictly observed. In addition, when used all applicable legal and safety regulations for the respective application must be observed. The same applies correspondingly to the use of accessories.

1.2 Intended Usage

Units from the controller series UR are used for displaying and monitoring of process values. Any other use is regarded not in accordance with the intended usage. Units from the controller series UR are not meant to be used as sole safety means to prevent dangerous situations on machinery and installations. Machinery and intallations must be so designed that fault conditions can not lead to harmful situations to operating personnel (e.g. by independent limit value switches, mechanical locking etc.).

1.3 Qualified personnel

Units from the controller series UR must only be operated in accordance with the technical specifications by qualified personnel. Personnel regarded qualified is familiar with the installation, assembly, putting into operation and operation of the units and possesses adequate professional qualification for the task.

1.4 Remaining hazards

Units from the controller series UR are state of the art and safe to operate. A risk of danger can occur when deployed and operated improperly by untrained personnel.

In this manual remaining hazards are marked by the following warning symbol:



This symbol indicates that non-observance of the safety guidelines may cause hazards to persons even serious injury or death and/or the possibility of property damage.

1.5 CE Conformity

The CE certificate is available at our company. We are pleased to send you a copy of it. Please feel free and contact us to get a copy.

2 Model identification

UR4848 series includes three versions. Looking at the table here below it is possible to find the required model.

Power supply 24...230 Vac/Vdc +/-15% 50/60 Hz – 5,5 VA	
UR484802	2 relays 5 A or 1 relay + 1 Ssr/V/mA
UR484803	2 relays 5 A + 1 Ssr/V/mA + RS485 + current transformer*
UR484804	3 relays 5 A + 1 Ssr/V/mA + current transformer*

* Models with current transformer input for “Loop Break Alarm” function.

3 Technical Data

3.1 General data

Indicators	4x0.40 inch displays 4x0.30 inch displays
Operating temperature	Temperature 0-45 °C Humidity 35..95 uR%
Sealing	IP65 front panel (with gasket) IP20 box and terminals
Material	PC ABS UL94VO self-extinguishing
Weight	165 g (-20ABC) / 185 g (-21/31ABC)

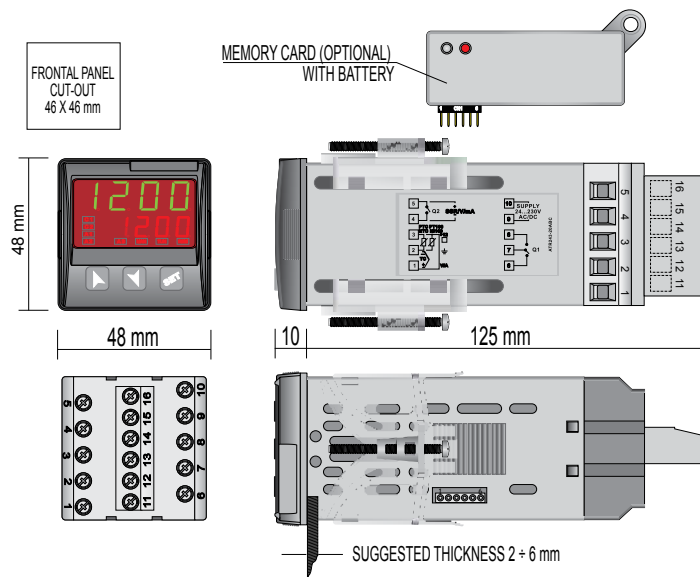
3.2 Hardware data

	1: AN1 configurable via software. Input: Thermocouple type K, S, R, J. Automatic compensation of cold junction from 0°C to 50°C. Thermoresistance: PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (β 3435K). Linear: 0-10 V, 0-20 or 4-20 mA, 0-40 mV. Current transformer: 50 mA, 1024 points on version UR484803/04. Potentiometers: 6 K Ω , 150 K Ω .	Tolerance (25 °C) +/-0.2% $\pm$ 1 digit for thermocouple input, thermo resistance and V / mA. Cold junction accuracy 0.1 °C/°C.
Analogue input		Impedance: 0-10 V: Ri > 110 K Ω 0-20 mA: Ri < 5 Ω 4-20 mA: Ri < 5 Ω 0-40 mV: Ri > 1 M Ω
Relay output	2 Relays (UR484802/03). 3 Relays (UR484804). Configurable as command and / or alarm output.	Contacts 5 A - 250 V~. Resistive load.
SSR/V/mA output	1 Linear 0/4...20 mA / SSR/0...10 Volt. • Deselecting OUT2 relay on UR484802. Configurable as command output or retransmission of setpoint or process.	Configurable: • 0/4...20 mA (Resolution 6000 points, Rmax 500 Ω); • 0...10 Volt (Resolution 9500 points, Rmin 300 Ω).

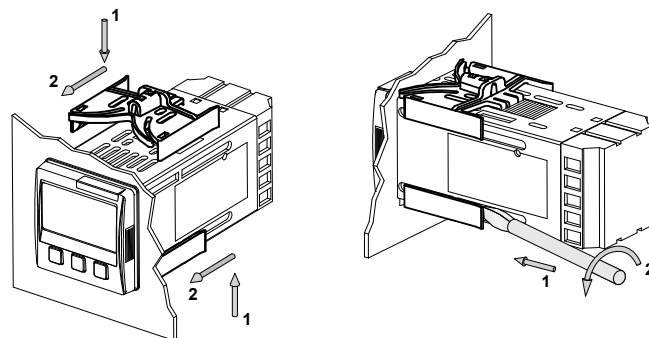
3.3 Software data

Regulation algorithms	ON - OFF with hysteresis. P, P.I., P.I.D., P.D. with proportional time.
Proportional band	0...9999 °C or °F
Integral time	0,0...999,9 sec. (0 excludes integral function)
Derivative time	0,0...999,9 sec. (0 excludes derivative function)
Controller functions	Manual or automatic Tuning, configurable alarms, protection of command and alarm setpoints, activation of functions via digital input, preset cycle with Start / Stop.

4 Dimensions and Installation



4.1 Panel assembly

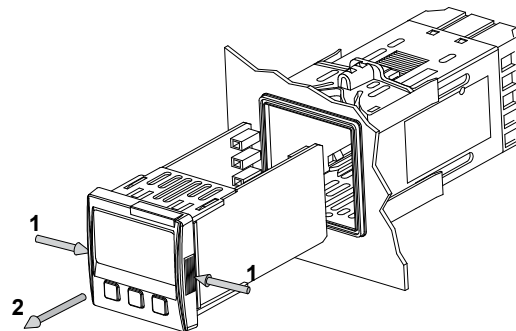


Method of panel assembly and fixing of anchorage hooks.

To dismantle, use a screwdriver and slightly force the fixing hooks to remove them from the fixing guide.

4.2 Electronics Removal

To remove the electronics, grip the front part using the two specific side ridges.



Disconnect the device from the mains before starting to configure or service it.

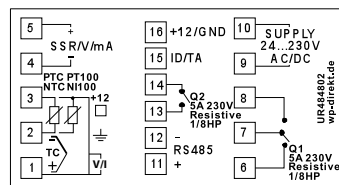
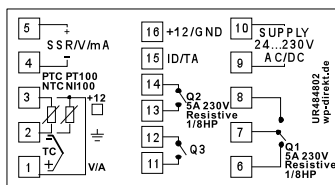
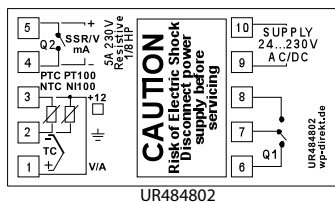
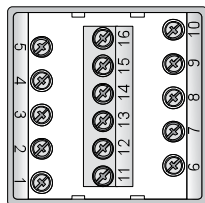
5 Electrical wirings



Although this controller has been designed to resist noises in an industrial environment, please notice the following safety guidelines:

- Separate control lines from the power wires.
- Avoid the proximity of remote control switches, electromagnetic meters, powerful engines.
- Avoid the proximity of power groups, especially those with phase control.

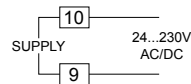
5.1 Wiring diagram



UR484803

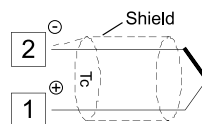
UR484804

Power



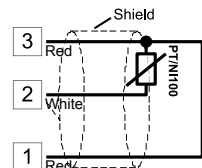
Switching power supply with extended range 24...230 Vac/dc $\pm 15\%$ 50/60 Hz – 5,5 VA (with galvanic isolation).

AN1 Analogue Input



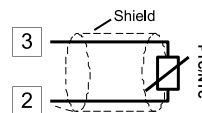
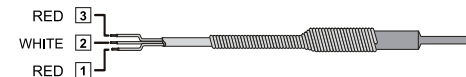
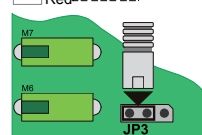
For thermocouples K, S, R, J.

- Comply with polarity.
- For possible extensions, use a compensated wire and terminals suitable for the thermocouples used (compensated).
- When shielded cable is used, it should be grounded at one side only.



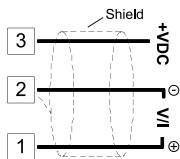
For thermoresistances PT100, NI100.

- For the three-wire connection use wires with the same section.
- For the two-wire connection short-circuit terminals 1 and 3.
- When shielded cable is used, it should be grounded at one side only.
- Select internal jumper JP3 as in the figure.



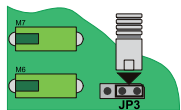
For thermoresistances NTC, PTC, PT500, PT1000 e potentiometers.

When shielded cable is used, it should be grounded at one side only to avoid ground loop currents.



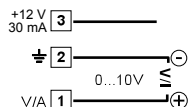
For linear signals V / mA.

- Comply with polarity.
- When shielded cable is used, it should be grounded at one side only.
- Select internal jumper JP3 as in the figure.



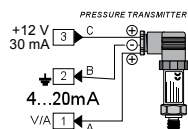
If jumpers are not properly selected, 12 Vdc / 30 mA are not available on terminal 3 to power the sensor.

Example of Connection for linear input Volt and mA



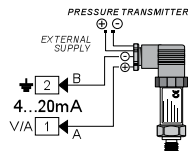
For signals 0...10 V.

Comply with polarity.



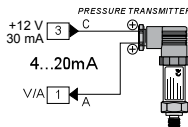
For signals 0/4...20 mA with **three-wire sensor**.

Comply with polarity:
A= Sensor output
B= Sensor ground
C= Sensor power



For signals 0/4...20 mA with **external power of sensor**.

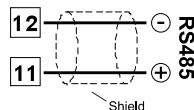
Comply with polarity:
A= Sensor output
B= Sensor ground



For signals 0/4...20 mA with **two-wire sensor**.

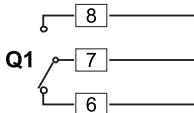
Comply with polarity:
A= Sensor output
C= Sensor power supply

Serial Input



RS485 Modbus RTU communication.

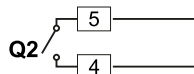
Relay Q1 Output



Capacity 5 A / 250 V~ for resistive loads.

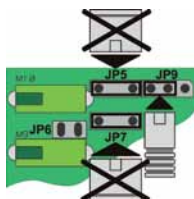
NB: see graphic next page.

Relay Q2 output for UR484802



Capacity 5 A / 250 V~ for resistive loads.

To select Q2 as relay output, remove jumpers JP5 and JP7 as indicated in the figure (in the figure is shown default configuration).

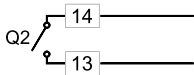


NB: see graphic next page.



Connecting a load without removing the jumpers will permanently damage the controller.

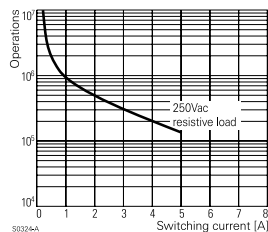
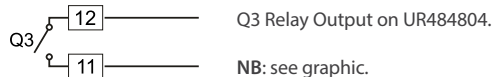
Relay Q2 output for UR484803 and UR484804



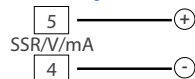
Capacity 5 A / 250 V~ for resistive loads.

NB: see graphic.

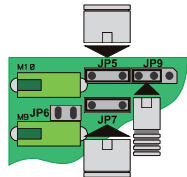
Relay Q3 output for UR484804



SSR output

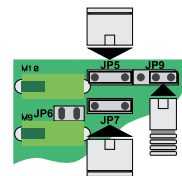


SSR command output 12 V / 30 mA.



Insert JP5 and JP7 and select JP9 as in the figure to use the SSR output.

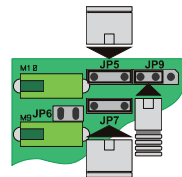
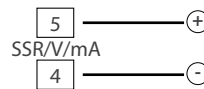
mA / Volt output



Linear output in mA configurable using parameters as command (parameter *c.out*) or retransmission of process-setpoint (parameter *r.Etr*).



Insert JP5 and JP7 and select JP9 as in figure to use the output in mA.

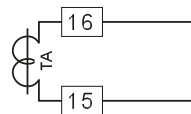


Linear output in Volt configurable using parameters as command (parameter *c.out*) or retransmission of process-setpoint (parameter *r.Etr*).

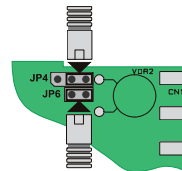


Insert JP5 and JP7 and select JP9 as in figure to use the linear output in Volt.

Current Transformer Input on UR484802 and UR484804



- Input 50 mA for current transformer.
- Sampling time 80 ms.
- Configurable by parameters.



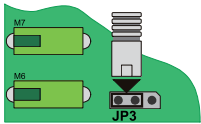
Insert JP4 and JP6 as in figure to select the amperometric transformer input.

Digital Input on UR484802

+ 12V 3 _____
GND _____

I D 2 _____

Digital input using parameter $d\bar{U}t$.
The use of digital input in this version is possible only
with TC sensors, 0...10 V, 0/4...20 mA and 0...40 mV.



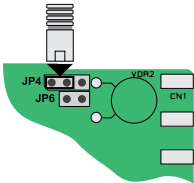
Select internal jumper JP3 as in figure.

Digital Input on UR484803 and UR484804

+ 12V 16 _____
GND _____

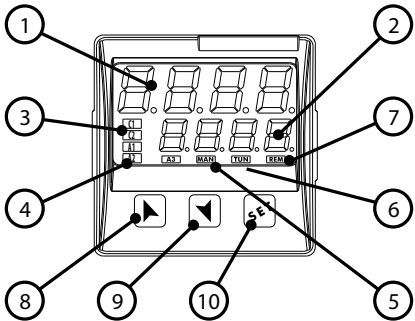
I D 15 _____

Digital input using parameter $d\bar{U}t$.



Insert JP4 as in figure to select the digital
input.

6 Display and Key Functions



6.1 Numeric Indicators (Display)

- | | | |
|---|--|---|
| 1 | | Normally displays the process. During the configuration phase, it displays the parameter being inserted. |
| 2 | | Normally displays the setpoint. During the configuration phase, it displays the parameter value being inserted. |

6.2 Meaning of Status Lights (Led)

- | | | |
|---|-----------------|---|
| 3 | C1 C2 | ON when the output command is on.
C1 with relay/SSR/mA/Volt command or C1 (open) and C2 (close) for a motorised valve command. |
| 4 | A1 A2 A3 | ON when the corresponding alarm is on. |
| 5 | MAN | ON when the "Manual" function is on. |
| 6 | TUN | ON when the controller is running an "Autotune" cycle. |
| 7 | REM | ON when the controller communicates via serial port. |

6.3 Keys

8		Allows to increase the main setpoint.
		During the configuration phase, allows to slide through parameters. Together with the  key it modifies them.
9		Pressed after the  key it allows to increase the alarm setpoint.
		Allows to decrease the main setpoint.
10		During the configuration phase, allows to slide through parameters. Together with the  key it modifies them.
		Pressed after the  key it allows to decrease the alarm setpoint.
		Allows to display the alarm setpoint and runs the autotuning function.
		Allows to vary the configuration parameters.

7 Controller Functions



7.1 Modifying Main Setpoint and Alarm Setpoint Values

The setpoint value can be changed by keyboard as follows:

	Press	Display	Do
1	 or 	Value on display 2 changes.	Increases or decreases the main setpoint.
2		Visualize alarm setpoint on display 1 value being inserted.	
3	 or 	Value on display 2 changes.	Increases or decreases the alarm setpoint value.

7.2 Auto-Tuning

Tuning procedure calculates the controller parameters and can be manual or automatic according to selection on parameter 57 (*tunE*).

7.3 Manual Tuning

Manual procedure allows the user greater flexibility to decide when to update P.I.D. algorithm work parameters. The procedure can be activated in two ways.

- Running Tuning by keyboard:**
Press  key until display 1 shows the writing *tunE* with display 2 showing *oFF*, press , display 2 shows *on*.
TUN led switches on and the procedure begins.
- Running Tuning by digital input:**
Select *tunE* on parameter 61 *dCt. i*. At first activation of digital input (commutation on front panel) **TUN** led switches on and at second activation switches off.

7.4 Automatic Tuning

Automatic tuning activates when the controller is switched on or when the setpoint is modified to a value over 35%.
To avoid an overshoot, the treshhold where the controller calculates new P.I.D. parameters is determined by the setpoint value minus the “Set Deviation Tune” (see parameter 58 *S.d.tu.*).

To exit Tuning and keep P.I.D. values unchanged, press  key until display 1 shows the writing *tunE* and display 2 shows *on*. Press , display 2 shows *oFF*.
TUN led switches off and procedure finishes.

7.5 Soft-Start

To reach the setpoint the controller can follow a gradient expressed in units (example: Degree/Hours).

Enter the gradient on parameter 62 *GrAd*, with chosen Units/Hours; only on subsequent activation the controller uses Soft-Start function.

If parameter 59 *oP.No* is set on *cont*, and parameter 63 *NA.t* is different from 0, after switch-on and elapsing of the time set on parameter 63, setpoint does not follow the gradient anymore, but it reaches final setpoint with maximum power.

Autotuning does not work when Soft-Start is activated: otherwise if parameter 63 *NA.t* is different from 0 and parameter 57 *tunE* is set on *Auto*, Autotuning starts when Soft-Start time is finished.

If parameter 57 *tunE* is set on *MAN*, the Autotuning can be started only when Soft-Start finishes.

7.6 Automatic / Manual Regulation for % Output Control

This function allows to select automatic functioning or manual command of the output percentage.

With parameter 60 *AutoMAN*, can select two methods.

1 First selection (*En*)

Pressing  key display 1 shows *P---*, while display 2 shows *Auto*.

Pressing  key display shows *MAN*; it is now possible to change the output percentage using  and . To return to automatic mode, using the same procedure, select *Auto* on display 2: led *MAN* switches off and functioning returns to automatic mode.

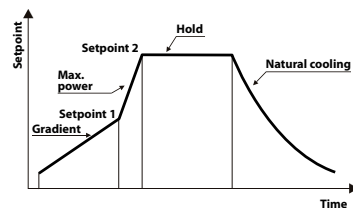
2 Second selection (*EnSt*)

enables the same functioning, but with two important variants:

- If there is a temporary power failure or after switch-off, the manual functioning as well as the previous output percentage value will be maintained at restarting.
- If the sensor breaks during automatic functioning, the controller moves to manual mode while maintaining the output percentage command unchanged as generated by the P.I.D. immediately before breakage.

7.7 Pre-Programmed Cycle

The pre-programmed cycle function activates by setting *Pr.cY* or *Pr.SS* on parameter 59 *oP.No*.

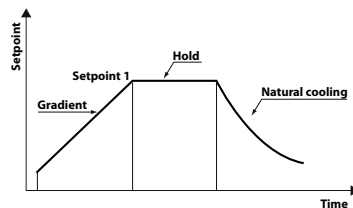


First selection (*Pr.cY*):

the controller reaches setpoint1 basing on the gradient set on parameter 62 *GrAd*, then it reaches maximum power up to setpoint 2. When the process reaches maximum power, this setpoint is maintained for the time set on parameter 63 *NA.t*.

On expiry, the command output is disabled and controller displays *StoP*. Cycle starts at each activation of the

controller, or via digital input if it is enabled for this type of functioning (see parameter 61 *dCt.i*).



Second selection (*Pr.cSt*):

start-up is decided only on activation of the digital input, according to the setting of parameter 61 *dCt.i*. On start-up, controller reaches setpoint 1 following gradient set in parameter 62 *GrAd*.

When the process reaches this gradient, it is maintained for the time set

on parameter 63 *NA.t*. On expiry, command output is disabled and the controller displays *StoP*.

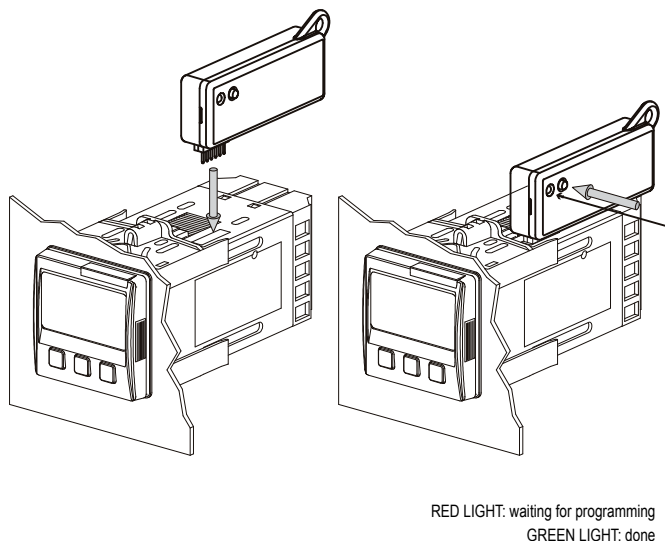
7.8 Programming module (optional)



Parameters and setpoint values can be duplicated from one controller to another using the programming module.

2 modes are available:

- With the controller connected to the power supply. Insert programming module **when the controller is off**. On activation display 1 shows *MEMO* and display 2 shows *---* (**only if the correct values are saved in the programming module**). By pressing  key display 2 shows *Load*, then confirm using  key. Controller loads the new value and restarts.



- With the controller not connected to power supply. The programming module is equipped with an internal battery with an autonomy of about 1000 uses (2032 button battery, replaceable). Insert the programming module and press the programming buttons. When writing the parameters, led turns red and on completing the procedure it changes to green. It is possible to repeat the procedure without any particular attention.



Updating Programming module

To update the programming module values, follow the procedure described on first mode, setting display 2 to ---- so as not to load the parameters on controller¹. Enter configuration and **change at least one parameter**. Exit configuration. Changes are stored automatically.

¹ If on activation the controller does not display $\overline{P}E\overline{P}a$ it means no data have been saved on the programming module, but it is possible to update values.

7.9 Loading default values

This procedure allows to restore factory settings of the instrument.

	Press	Display	Do
1	 for 3 seconds	Display 1 visualizes 0.000 with 1st digit blinking, while display 2 shows PASS.	
2	 0 	Change blinking digit and move to the next one with  .	Enter password: 9999.
3	 to confirm	Device loads default settings.	Turn off and restart the instrument.

7.10 Latch on function

For use with input $P_{oL.1}$ (potentiometer 6 K Ω) and $P_{oL.2}$ (potentiometer 150 K Ω) and with linear input (0...10 V, 0...40 mV, 0/4...20 mA), it is possible to associate start value of the scale (parameter 6 $L_{oL.1}$) to the minimum position of the sensor and value of end scale (parameter 7 $uP.L.1$) to the maximum position of the sensor (parameter 8 L_{ALC} , configured as S_{Ed}).

It is also possible to fix the point in which the controller will display 0 (however keeping the scale range between $L_{oL.1}$ and $uP.L.1$) using the “virtual zero” option by setting u_{DSE} or u_{Din} in parameter 8 L_{ALC} .

If you set u_{Din} the virtual zero will reset after each activation of the tool; if you set u_{DSE} the virtual zero remains fixed once tuned.

To enable the LATCH ON function select chosen configuration for parameter L_{ALC}^2 .

For the calibration procedure refer to the following table:

	Press	Display	Do
1		Exit parameters configuration. Display 2 shows the writing L_{ALC} .	Place the sensor on minimum operating value (associated with $L_{oL.1}$).

² The tuning procedure starts by exiting the configuration after changing the parameter.

	Press	Display	Do
2		Set the value on minimum. Display shows LbA .	Place the sensor on maximum operating value (associated with uPL).
3		Set the value to maximum. The display shows HGH .	To exit standard procedure press . For "virtual zero" settings place the sensor on the zero point.
4		Set the virtual zero value. Display shows $uirt$. NB: For selection of $uirt$ the procedure in point 4 should be followed on each re-activation.	To exit procedure press .



7.11 Loop Break Alarm On Current Transformer

This function allows to measure load current and to manage an alarm during malfunctioning (with power in short circuit or always off).

The current transformer connected to terminals 15 and 16 must be 50 mA (sampling time 80 ms).

- Set end scale value of the current transformer in Amperes on parameter 47 LbA .
- Set the intervention threshold of the Loop Break Alarm in Amperes on parameter 48 $LbAL$.
- Set the intervention delay time of the Loop Break Alarm on parameter 49 $LbAd$.
- It is possible to associate the alarm with a relay by setting the parameter RL . 1, RL . 2 or RL . 3 as RL . 4.

If a remote control switch or SSR remains closed, controller signals the fault by showing $LbAL$ on display 2 (alternatively with a command setpoint).

If the power stage remains open, or the load current is lower than the value set on $LbAL$, controller shows $LbAL$ on display. It is possible to display the current absorbed during the closure phase of the power stage.

	Press	Display	Do
1		This key enables to scroll on display 2 the output percentage, auto / man selection, setpoint and alarms.	Press until the writing $RLAL$ appears on display 1 and display 2 shows the current in amperes (LbA > 0). The value is also maintained when no current circulates on the load.

Setting on parameter 48 $LbAL$ the value 0 it is possible to visualize the current absorbed without generating the Loop Break Alarm.

7.12 Digital Input Functions

On UR4848 model, digital input can be enabled by using parameters 59 $oPNa$ and 61 dGE .

• Parameter 59 $oPNa$.

NB: When using this settings, parameter 61 dGE is ignored.

$2LS$: Switch two thresholds setpoint: with open contact UR4848 regulates on SET1; with closed contact regulates on SET2;

$2LS$: Switch two thresholds setpoint: setpoint selection is done by an impulse on digital input;

$3LS$: Switch three thresholds setpoint by an impulse on digital input;

$4LS$: Switch four thresholds setpoint by an impulse on digital input;

$LE5$: Customized function;

$PC55$: Pre-programmed cycle (see paragraph 7.7).

Setpoints values can be modified any time pressing key.

• Parameter 61 dGE .

NB: Settings on this parameter are available only if $cont$ or $PrCY$ are selected on parameter 59 $oPNa$.

SE : Start / Stop; operating on digital input the controller switches alternatively from start to stop;

$runo$: Run N.O. Controller is in start only with closed input;

$runnc$: Run N.C. Controller is in start only with open input;

$LCno$: With closed input allows to lock the reading of sensors;

L.c.n.c.: With open input allows to lock the reading of sensors;
E.unE: Enables / disables Tuning function if parameter 57 *E.unE* is selected as *PARn*;
PARn.i: If parameter 60 *PARn* is selected as *En* or *En.5t* controller switch from automatic to manual functioning;
PARn.c: If parameter 60 *PARn* is selected as *En* or *En.5t* UR4848 works in automatic mode if input is open or in manual mode if input is closed.

NB: The digital input functions **are not** available with sensors PT100 and NI100 on model UR484802.

7.13 Dual Action Heating-Cooling

UR4848 is suitable also for systems requiring a combined heating-cooling action. Command output must be configured as Heating P.I.D. (*Act.t. = HEAt* and with a *P.b.* greater than 0), and one of the alarms (*AL. 1*, *AL. 2* or *AL. 3*) must be configured as *cool*.

Command output must be connected to the actuator responsible for heat, while the alarm will control cooling action.

Parameters to configure for the Heating P.I.D. are:

Act.t. = HEAt Command output type (Heating);

P.b.: Heating proportional band;

t.i: Integral time heating and cooling;

t.d.: Derivative time heating and cooling;

t.c.: Heating time cycle.

Parameters to configure for the Cooling P.I.D. are the following (ex: action associated to alarm 1):

AL. 1 = cool Alarm 1 selection (Cooling);

P.b.: Proportional band multiplier;

o.u.d.b.: Overlapping / Dead band;

co.t.c.: Cooling time cycle.

Parameter *P.b.1.* (that ranges from 1.00 to 5.00) determines the proportional band of cooling basing on the formula:

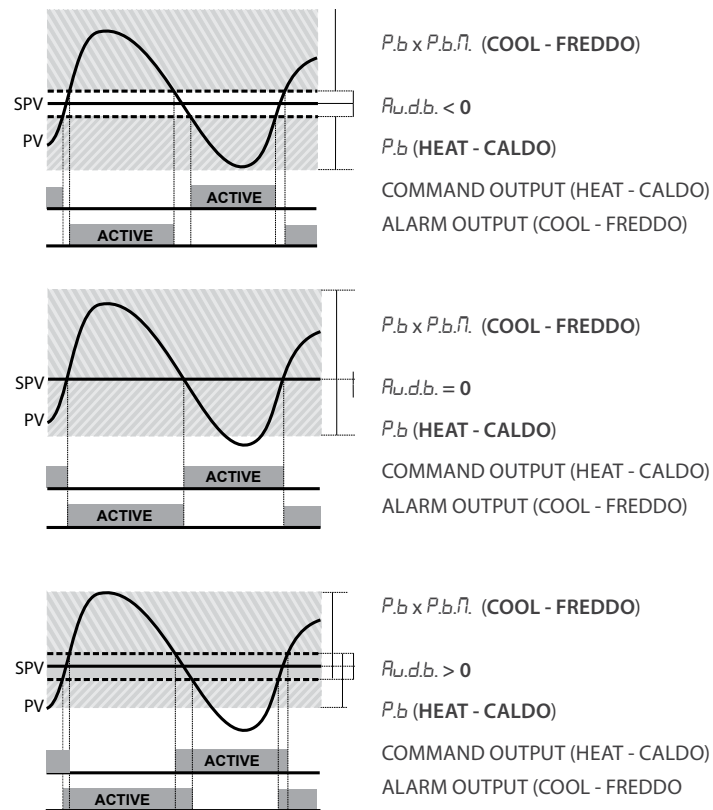
Cooling proportional band = $P.b. \times P.b.1.$

This gives a proportional band for cooling which will be the same as heating band if *P.b.1.* = 1.00, or 5 times greater if *P.b.1.* = 5.00.

Integral and derivative time are the same for both actions.

Parameter *o.u.d.b.* determines the percentage overlapping between the two actions. For systems in which the heating and cooling output must never be simultaneously active a dead band (*o.u.d.b.* ≤ 0) can be configured, and vice versa an overlapping (*o.u.d.b.* > 0).

The following figure shows an example of dual action P.I.D. (heating-cooling) with *t.i.* = 0 and *t.d.* = 0.



Parameter *co.t.c.* has the same meaning as the heating time cycle *t.c.*
Parameter *coo.F.* (cooling fluid) pre-selects the proportional band multiplier *P.b.Π.* and the cooling P.I.D. time cycle *co.t.c.* basing on the type of cooling fluid:

<i>coo.F.</i>	Cooling fluid type	<i>P.b.Π.</i>	<i>co.t.c.</i>
<i>Air</i>	Air	1.00	10
<i>oil</i>	Oil	1.25	4
<i>H2O</i>	Water	2.50	2

Once selected, parameter *coo.F.*, parameters *P.b.Π.*, *oud.b.* and *co.t.c.* can however be changed.

8 Serial Communication

UR484803, equipped with RS485, can receive and broadcast data via serial communication using MODBUS RTU protocol. The device can only be configured as a Slave. This function enables the control of multiple controllers connected to a supervisory system (SCADA).
Each controller responds to a master query only if the query contains the same address as that in the parameter *SLAd.*
The permitted addresses range from 1 to 254 and there must not be controllers with the same address on the same line.
Address 255 can be used by the master to communicate with all the connected equipment (broadcast mode), while with 0 all the devices receive the command, but no response is expected.
UR4848 can introduce a delay (in milliseconds) in the response to the master request. This delay must be set on parameter *72 SE.dE.*
Each parameter change is saved by the controller on EEPROM memory (100000 writing cycles), while the setpoints are saved with a delay of ten seconds after the last change.

NB: changes made to Words that are different from those reported in the following table can lead to malfunction.

Modbus RTU protocol features	
Baud-rate	Selection on parameter <i>70 bd.r.t.</i> :
	~~4.8~~ 4.800 bit/Sec.
	~~9.6~~ 9.600 bit/Sec.
	~~19.2~~ 19.200 bit/Sec.
	~~28.8~~ 28.800 bit/Sec.
	~~38.4~~ 38.400 bit/Sec.
	~~57.6~~ 57.600 bit/Sec.
Format	8, N, 1 (8 bit, no parity, 1 stop)
Supported functions	WORD READING (max 20 word) (0x03, 0x04)
	SINGLE WORD WRITING (0x06)
	MULTIPLE WORDS WRITING (max 20 word) (0x10)

Looking at the table here below it is possible to find all available addresses and functions:

RO	Read Only	R/W	Read / Write	WO	Write Only
Modbus Address	Description			Read Only	Reset value
0	Device type			RO	EEPROM
1	Software version			RO	EEPROM
5	Slave address			R/W	EEPROM
6	Boot version			RO	EEPROM
50	Automatic addressing			WO	-
51	System code comparison			WO	-
500	Loading default values (write 9999)			R/W	0
510	Setpoints storing time in eeprom (0-60 s)			R/W	10
999	Process subjected to the visualization filter			RO	-
1000	Process (degrees.tenths for temperature sensors; digits for linear sensors)			RO	-
1001	Setpoint 1			R/W	EEPROM
1002	Setpoint 2			R/W	EEPROM
1003	Setpoint 3			R/W	EEPROM
1004	Setpoint 4			R/W	EEPROM
1005	Alarm 1			R/W	EEPROM
1006	Alarm 2			R/W	EEPROM
1007	Alarm 3			R/W	EEPROM
1008	Setpoint gradient			RO	EEPROM

Modbus Address	Description	Read Only	Reset value
1009	Relay status (0 = Off, 1 = On): Bit 0 = Relay Q1 Bit 1 = Relay Q2 Bit 2 = Reserved Bit 3 = SSR	RO	0
1010	Heating output percentage (0-10000)	RO	0
1011	Cooling output percentage (0-10000)	RO	0
1012	Alarms status (0 = None, 1 = Active) Bit 0 = Alarm 1 Bit 1 = Alarm 2 Bit 2 = Alarm 3	RO	0
1013	Manual reset: write 0 to reset all alarms. In reading (0 = Not resettable, 1 = Resettable) Bit 0 = Alarm 1 Bit 1 = Alarm 2 Bit 2 = Alarm 3	WO	0
1014	Error flags Bit 0 = Eeprom writing error Bit 1 = Eeprom reading error Bit 2 = Cold junction error Bit 3 = Process error (sensor) Bit 4 = Generic error Bit 5 = Hardware error Bit 6 = L.B.A.O. error Bit 7 = L.B.A.C. error Bit 8 = Missing calibration data error	RO	0
1015	Cold junction temperature (degrees.tenths)	RO	-
1016	Start / Stop 0 = Controller in STOP 1 = Controller in START	R/W	0
1017	Lock conversion ON / OFF 0 = Lock conversion off 1 = Lock conversion on	R/W	0
1018	Tuning ON / OFF 0 = Tuning off 1 = Tuning on	R/W	0
1019	Automatic / manual selection 0 = Automatic 1 = Manual	R/W	0

Modbus Address	Description	Read Only	Reset value
1020	T.A. current ON (Ampere with tenths)	RO	-
1021	T.A. current OFF (Ampere with tenths)	RO	
1022	OFF LINE* time (milliseconds)	R/W	
1023	Instant Current (Ampere)	R/W	0
1024	Digital Input State	R/W	0
1025	Synchronized Tuning for multizone system 0 = Tuning OFF (Normal operating of the regulator) 1 = Output command OFF 2 = Output command ON 3 = Start Tuning 4 = End Tuning and output command OFF (Write 0 for normal operating)	R/W	0
1099	Process subjected to the visualization filter and decimal point selection	RO	
1100	Process with decimal point selection	RO	
1101	Setpoint 1 with decimal point selection	R/W	EEPROM
1102	Setpoint 2 with decimal point selection	R/W	EEPROM
1103	Setpoint 3 with decimal point selection	R/W	EEPROM
1104	Setpoint 4 with decimal point selection	R/W	EEPROM
1105	Alarm 1 with decimal point selection	R/W	EEPROM
1106	Alarm 2 with decimal point selection	R/W	EEPROM
1107	Alarm 3 with decimal point selection	R/W	EEPROM
1108	Gradient Setpoint with decimal point selection	RO	EEPROM
1109	Percentage heating output (0-1000)	R/W	0
1110	Percentage heating output (0-100)	RO	0
1111	Percentage cooling output (0-1000)	RO	0
1112	Percentage cooling output (0-100)	RO	0
2001	Parameter 1	R/W	EEPROM
2002	Parameter 2	R/W	EEPROM
2072	Parameter 72	R/W	EEPROM
3000	Disabling serial control of machine**	RO	0
3001	First word display 1 (ascii)	R/W	0
3002	Second word display 1 (ascii)	R/W	0
3003	Third word display 1 (ascii)	R/W	0

* If value is 0, control is disabled. If different from 0, it is the max. time that can elapse between two pollings before the controller goes off-line. If it goes off-line, the controller returns to Stop mode, control output is disabled but the alarms are active.

** By writing 1 on this word, the effects of the writing are cancelled on all the Modbus addresses from 3001 to 3022. Control therefore returns to the controller.

Modbus Address	Description	Read Only	Reset value
3004	Fourth word display 1 (ascii)	R/W	0
3005	Fifth word display 1 (ascii)	R/W	0
3006	Sixth word display 1 (ascii)	R/W	0
3007	Seventh word display 1 (ascii)	R/W	0
3008	Eighth word display 1 (ascii)	R/W	0
3009	First word display 2 (ascii)	R/W	0
3010	Second word display 2 (ascii)	R/W	0
3011	Third word display 2 (ascii)	R/W	0
3012	Fourth word display 2 (ascii)	R/W	0
3013	Fifth word display 2 (ascii)	R/W	0
3014	Sixth word display 2 (ascii)	R/W	0
3015	Seventh word display 2 (ascii)	R/W	0
3016	Eight word display 2 (ascii)	R/W	0
3017	Word LED	R/W	0
	Bit 0 = LED C1		
	Bit 1 = LED C2		
	Bit 2 = LED A1		
	Bit 3 = LED A2		
	Bit 4 = LED A3		
	Bit 5 = LED MAN		
	Bit 6 = LED TUN		
3018	Word keys	R/W	0
	(write 1 to command keys)		
	Bit 0 = 		
	Bit 1 = 		
	Bit 2 = 		
3019	Word serial relay	R/W	0
	Bit 0 = Relay Q1		
	Bit 1 = Relay Q2		
	Bit 2 = Relay Q3		
3020	Word SSR serial (0 = Off, 1 = On)	R/W	0
3021	Word output 0...10 V serial (0...10000)	R/W	0
3022	Word output 4...20 mA serial (0...10000)	R/W	0
3023	Relay state in case of off-line (only if controlled by serial)	R/W	0
	Bit 0 = Relay Q1		
	Bit 1 = Relay Q2		
	Bit 2 = Relay Q3		

Modbus Address	Description	Read Only	Reset value
3024	Output state SSR / 0...10 V / 4...20 mA in case of off-line (only if controlled by serial) (0...10000)	R/W	0
3025	Serial process. Setting parameter 54 it is possible to make averages on the remote process	R/W	0
4001	Parameter 1***	R/W	EEPROM
4002	Parameter 2***	R/W	EEPROM
4072	Parameter 72***	R/W	EEPROM

9 Configuration

9.1 Modify Configuration Parameters

For configuration parameters see paragraph 10.

	Press	Display	Do
1	 for 3 seconds	Display 1 shows 0.000 with the 1st digit flashing, while display 2 shows PASS.	
2	 or 	Changes flashing digit and move to the next one using  key.	Enter password: 1234.
3	 to confirm	Display 1 shows the first parameter and display 2 shows the value.	
4	 or 	Slide up / down through parameters.	
5	  or 	Increase or decrease displayed value by pressing  and an arrow key.	Enter new data which will be saved on releasing the keys. To change another parameter return to point 4.
6	 +  simultaneously	End of configuration parameter change. The controller exits from programming.	

*** Parameters modified using serial address 4001 to 4072 will be stored on eeprom only after 10" since last writing of one parameter.

10 Table of Configuration Parameters

The following table includes all parameters. Some of them will not be visible on the models which are not provided with relevant Hardware data.

1 *Com* Command Output:

Command output type selection.

c. o1 **Default** (necessary for using process and setpoint retransmission function with Volt / mA output)

c. o2
c. SSR
c. uPL
c. 4.20
c. 0.20
c. 0.10

UR484802		
COMMAND		ALARM 1
<i>c. o1</i>	Q1	Q2
<i>c. o2</i>	Q2	Q1
<i>c. SSR</i>	SSR	Q1
<i>c. uPL</i>	Q1 (opens) / Q2 (closes)	-
<i>c. 4.20</i>	4 ... 20 mA	Q1
<i>c. 0.20</i>	0 ... 20 mA	Q1
<i>c. 0.10</i>	0 ... 10 mV	Q1

UR484803			
COMMAND		ALARM 1	ALARM 2
<i>c. o1</i>	Q1	Q2	SSR
<i>c. o2</i>	Q2	Q1	SSR
<i>c. SSR</i>	SSR	Q1	Q2
<i>c. uPL</i>	Q1 (opens) / Q2 (closes)	SSR	-
<i>c. 4.20</i>	4 ... 20 mA	Q1	Q2
<i>c. 0.20</i>	0 ... 20 mA	Q1	Q2
<i>c. 0.10</i>	0 ... 10 mV	Q1	Q2

UR484804				
	COMMAND	ALARM 1	ALARM 2	ALARM 3
<i>c. o1</i>	Q1	Q2	Q3	SSR
<i>c. o2</i>	Q2	Q1	SSR	SSR
<i>c. SSR</i>	SSR	Q1	Q2	Q3
<i>c. uPL</i>	Q1 (opens) / Q2 (closes)	Q1	SSR	-
<i>c. 4.20</i>	4 ... 20 mA	Q1	Q2	Q3
<i>c. 0.20</i>	0 ... 20 mA	Q1	Q2	Q3
<i>c. 0.10</i>	0 ... 10 mV	Q1	Q2	Q3

2 *Sen* Sensor

Analogue input configuration/sensor selection

<i>tc.K</i>	Tc-K (Default)	-260 °C ... 1360 °C
<i>tc.S</i>	Tc-S	-40 °C ... 1760 °C
<i>tc.R</i>	Tc-R	-40 °C ... 1760 °C
<i>tc.J</i>	Tc-J	-200 °C ... 1200 °C
<i>Pt</i>	Pt100	-200 °C ... 600 °C
<i>Pt1</i>	Pt100	-200 °C ... 140 °C
<i>ni</i>	NI100	-60 °C ... 180 °C
<i>ntc</i>	NTC10K	-40 °C ... 125 °C
<i>Ptc</i>	PTC1K	-50 °C ... 150 °C
<i>Pt5</i>	Pt500	-100 °C ... 600 °C
<i>Pt1k</i>	Pt1000	-100 °C ... 600 °C
<i>0.10</i>	0 ... 10 Volt	
<i>0.20</i>	0 ... 20 mA	
<i>4.20</i>	4 ... 20 mA	
<i>0.40</i>	0 ... 40 mV	
<i>Pot.1</i>	Potentiometer max 6 Kohm (See paragraph 7.10)	
<i>Pot.2</i>	Potentiometer max 150 Kohm (See paragraph 7.10)	
<i>tr.</i>	50 mA secondary Current transformer (Only UR484803/04)	

3 *dP* Decimal Point

Select type of visualized decimal point

<i>0</i>	Default
<i>0.0</i>	1 Decimal
<i>0.00</i>	2 Decimal
<i>0.000</i>	3 Decimal

4 *LoL.S.* **Lower Limit Setpoint**

Lower limit selectable for setpoint
-999...+9999 [digit³] (degrees.tenths for temperature sensors),
Default: 0.

5 *uPL.S.* **Upper Limit Setpoint**

Upper limit selectable for setpoint
-999...+9999 [digit³] (degrees.tenths for temperature sensors),
Default: 1750.

6 *LoL.l* **Lower Linear Input**

Range AN1 lower limit only for linear. Example: with input 4...20 mA this parameter takes value associated to 4 mA
-999 bis +9999 [digit³], Default: 0.

7 *uPL.l* **Upper Linear Input**

Range AN1 upper limit only for linear. Example: with input 4...20 mA this parameter takes value associated to 20 mA
-999 bis +9999 [digit³], Default: 1000.

8 *LAEc.* **Latch On Function**

Automatic setting of limits for linear inputs and potentiometers (see paragraph 7.10)
Disabled (Default)

Std. Standard

u0St. Virtual zero stored

u0 in Virtual zero initialized

9 *o.cAL.* **Offset Calibration**

Value added / subtracted to process visualization (usually correcting the value of environment temperature)
-999...+1000 [digit³] for linear sensors and potentiometers.
-200.0...+100.0 (degrees.tenths for temperature sensors),
Default 0.0.

10 *G.cAL.* **Gain Calibration**

Percentage value that is multiplied for the process value (allows to calibrated the working point)
-99.9%...+100.0% (Default = 0.0)

11 *Act.t.* **Action type**

Regulation type

HEAL Heating (N.O.) (Default)

cooL Cooling (N.C.)

H.o.o.S. Lock command above SPV. Example: command output disabled when reaching setpoint, also with P.I.D. value different from 0

12 *c. rE.* **Command Reset**

Type of reset for state of command contact (always automatic in P.I.D. functioning)

ArE. Automatic reset (Default)

MrE. Manual reset

MrE.S. Manual reset stored (keeps relay status also after an eventual power failure)

13 *c. SE.* **Command State Error**

State of contact for command output in case of error

c.o. Open contact (Default)

c.c. Closed contact

14 *c. Ld.* **Command Led**

State of the OUT1 led corresponding to the relevant contact

c.o. ON with open contact

c.c. ON with closed contact (Default)

15 *c. HY.* **Command Hysteresis**

Hysteresis in ON/OFF or dead band in P.I.D.
-999...+999 [digit³] (degrees.tenths for temperature sensors),
Default 0.0.

16 c. dE. Command Delay
 Command delay (only in ON / OFF functioning). In case of servo valve it also works in P.I.D. and represents the delay between opening and closure of the two contacts
 -180...+180 seconds (tenths of second in case of servo valve).
 Negative: delay in switching off phase.
 Positive: delay in activation phase.
Default: 0.

17 c. SP. Command Setpoint Protection
 Allows or not to modify the command setpoint value
 FrEE Modification allowed (**Default**)
 Locked Protected

18 Pb. Proportional Band
 Proportional band Process inertia in units (example: if temperature is in °C)
 0 ON / OFF $\frac{1}{10}$ if equal to 0 (**Default**)
 1-9999 [digit³] (degrees.tenths for temperature sensors)

19 t. i. Integral Time
 Process inertia in seconds
 0.0-999.9 seconds (0 = integral disabled), **Default:** 0.

20 t.d. Derivative Time
 Normally $\frac{1}{4}$ of integral time
 0.0-999.9 seconds (0 = derivative disabled), **Default:** 0.

21 t.c. Cycle Time
 Cycle time (for P.I.D. on remote control switch 10 / 15 sec., for P.I.D. on SSR 1 sec.) or servo time (value declared by servo-motor manufacturer)
 1-300 seconds, **Default:** 10.

22 o.PoL. Output Power Limit
 Selects max value for command output percentage.
 0-100%, **Default:** 100%.

23 AL. 1 Alarm 1
 Alarm 1 selection. Alarm intervention is related to AL1 (See paragraph 11)
 d. S. Disabled (**Default**)
 A. AL. Absolute alarm, referring to process
 b. AL. Band alarm
 H.d.AL. Upper deviation alarm
 L.d.AL. Lower deviation alarm
 A.c.AL. Absolute alarm, referring to command setpoint
 St.AL. Status alarm (active in Run / Start)
 cool Cooling action
 L.b.A. Status alarm "load control" (Loop Break Alarm). Example: status of contactors / SSR or heating elements

24 AL. S.O. Alarm 1 State Output
 Alarm 1 output contact and intervention type
 n.o. S. (N.O. start) Normally open, active at start
 n.c. S. (N.C. start) Normally closed, active at start
 n.o. t. (N.O. threshold) Normally open, active on reaching alarm⁴
 n.c. t. (N.C. threshold) Normally closed on reaching alarm⁴

25 AL. R.E. Alarm 1 Reset
 Alarm 1 contact reset type
 Ar.E. Automatic reset (**Default**)
 Mr.E. Manual reset 
 Mr.E.S. Manual reset stored. (keeps relay status also after an eventual power failure)

³ Display of decimal point depends on setting of parameter SEr. and parameter dP.

⁴ On activation, the output is inhibited if the controller is in alarm mode. Activates only if alarm condition reappears, after that it was restored.

26 *R.1S.E.* Alarm 1 State Reset

	State of contact for alarm 1 output in case of error
<i>c.o.</i>	Open contact (Default)
<i>c.c.</i>	Closed contact

27 *R.1L.d.* Alarm 1 Led

	Defines the state of OUT2 led corresponding to the relative contact
<i>c.o.</i>	ON with open contact
<i>c.c.</i>	ON with closed contact (Default)

28 *R.1HY.* Alarm 1 Hysteresis

-999...+999 [digit⁵] (degrees.tenths for temperature sensors),
Default: 0.0.

29 *R.1d.E.* Alarm 1 Delay

-180...+180 seconds.
Negative: delay in alarm output phase.
Positive: delay in alarm entry phase.
Default: 0.

30 *R.1SP.* Alarm 1 Setpoint Protection

	Alarm 1 set protection. Does not allow user to modify setpoint
<i>FrEE</i>	Modification allowed (Default)
<i>LoCt</i>	Protected
<i>H idE</i>	Protected and not visualized

31 *AL. 2* Alarm 2

	Alarm 2 selection. Alarm intervention is related to AL2. (See par. 11)
<i>d .S.</i>	Disabled (Default)
<i>A. AL.</i>	Absolute alarm, referring to process
<i>b. AL.</i>	Band alarm
<i>H.d.AL.</i>	Upper deviation alarm
<i>L.d.AL.</i>	Lower deviation alarm
<i>A.c.AL.</i>	Absolute alarm, referring to command setpoint
<i>St.AL.</i>	Status alarm (active in Run / Start)
<i>cooL</i>	Cooling action
<i>L.b.A.</i>	Status alarm "load control" (Loop Break Alarm). Example: status of contactors / SSR or heating elements

32 *A.2So.* Alarm 2 State Output

	Alarm 2 output contact and intervention type
<i>n.o. S</i>	(N.O. start) Normally open, active at start (Default)
<i>n.c. S</i>	(N.C. start) Normally closed, active at start
<i>n.o. t</i>	(N.O. threshold) Normally open, active on reaching alarm ⁶
<i>n.c. t</i>	(N.C. threshold) Normally closed, active on reaching alarm ⁶

33 *A.2rE.* Alarm 2 Reset

	Alarm 2 contact reset type
<i>ArE.</i>	Automatic reset (Default)
<i>MrE.</i>	Manual reset (reset / manual reset by keyboard) 
<i>MrE.S.</i>	Manual reset stored. (keeps relay status also after an eventual power failure)

34 *A.2S.E.* Alarm 2 State Error

	State of contact for alarm 2 output in case of error
<i>c.o.</i>	Open contact (Default)
<i>c.c.</i>	Closed contact

35 *A.2L.d.* Alarm 2 Led

	State of OUT2 led corresponding to relative contact
<i>c.o.</i>	ON with open contact
<i>c.c.</i>	ON with closed contact (Default)

36 *A.2HY.* Alarm 2 Hysteresis

-999...+999 [digit⁷] (degrees.tenths for temperature sensors),
Default: 0.0.

37 *A.2d.E.* Alarm 2 Delay

-180...+180 seconds.
Negative: delay in alarm exit phase.
Positive: delay in alarm entry phase.
Default: 0.

⁶ On activation, the output is inhibited if the controller is in alarm mode. Activates only if alarm condition reappears, after that it was restored.

⁷ Display of decimal point depends on setting of parameter *SEn.* and parameter *d.P.*

⁵ Display of decimal point depends on setting of parameter *SEn.* and parameter *d.P.*

38 *A.2.5.P.* Alarm 2 Setpoint Protection

	Alarm 2 set protection. Does not allow operator to change value set
<i>FrEE</i>	Modification allowed (Default)
<i>LocP</i>	Protected
<i>HiDE</i>	Protected and not visualized

39 *AL. 3* Alarm 3

	Alarm 3 selection. Alarm intervention is associated with AL3. (See paragraph 11)
<i>d.iS.</i>	Disabled (Default)
<i>A.AL.</i>	Absolute alarm, referring to process
<i>b.AL.</i>	Band alarm
<i>H.d.AL.</i>	Upper deviation alarm
<i>L.d.AL.</i>	Lower deviation alarm
<i>A.c.AL.</i>	Absolute alarm, referring to command setpoint
<i>St.AL.</i>	Status alarm (active in Run / Start)
<i>cool</i>	Cooling action
<i>L.b.A.</i>	Status alarm "load control" (Loop Break Alarm). Example: status of contactors / SSR or heating elements

40 *A.3.5.o.* Alarm 3 State Output

	Alarm 3 output contact and intervention type
<i>n.o. S.</i>	(N.O. start) Normally open, active at start
<i>n.c. S.</i>	(N.C. start) Normally closed, active at start
<i>n.o. t.</i>	(N.O. threshold) Normally open, active on reaching alarm ⁸
<i>n.c. t.</i>	(N.C. threshold) Normally closed, active on reaching alarm ⁸

41 *A.3.r.E.* Alarm 3 Reset

	Alarm 3 contact reset type
<i>Ar.E.</i>	Automatic reset (Default)
<i>Mr.E.</i>	Manual reset
<i>Mr.E.</i>	Manual reset stored. (keeps relay status also after an eventual power failure)

42 *A.3.5.E.* Alarm 3 State Error

	State of contact for alarm 3 output in case of error
<i>c.o.</i>	Open contact (Default)
<i>c.c.</i>	Closed contact

⁸ On activation, the output is inhibited if the controller is in alarm mode. Activates only if alarm condition reappears, after that it was restored.

43 *A.3.L.d.* Alarm 3 LED

	State of OUT3 led corresponding to relative contact
<i>c.o.</i>	ON with open contact
<i>c.c.</i>	ON with closed contact (Default)

44 *A.3.HY.* Alarm 3 Hysteresis

-999...+999 [digit°] (degrees.tenths for temperature sensors),
Default: 0.0.

45 *A.3.dE.* Alarm 3 Delay

-180...+180 seconds
Negative: delay in alarm exit phase.
Positive: delay in alarm entry phase.
Default: 0.

46 *A.3.5.P.* Alarm 3 Setpoint Protection

	Alarm 3 set protection. Does not allow operator to change the setpoint value
<i>FrEE</i>	Modification allowed (Default)
<i>LocP</i>	Protected
<i>HiDE</i>	Protected and not visualized

47 *t.A.* Current Transformer

Activation and scale range of current transformer
0 Disabled
1-200 Ampere
Default: 0

48 *L.b.A.t.* Loop Break Alarm Threshold

Intervention threshold of Loop Break Alarm
0.0-200.0 Ampere
Default: 50.0

49 *L.b.A.d.* Loop Break Alarm Delay

Delay time for Loop break alarm intervention
00.00-60.00 mm.ss
Default: 01.00

⁹ Display of decimal point depends on setting of parameter *SEn.* and parameter *d.P.*

50 *c.o.o.F.* Cooling Fluid

	Type of refrigerant fluid for heating / cooling P.I.D.
<i>Air</i>	Air (Default)
<i>Oil</i>	Oil
<i>H2O</i>	Water

51 *P.b.n.* Proportional Band Multiplier

Proportional band multiplier. Proportional band for cooling action is given by parameter 18 multiplied for this parameter.
1.00-5.00 (Default: 1.00)

52 *o.u.d.b.* Overlap / Dead Band

Dead band combination for heating / cooling action in heating / cooling P.I.D. mode (dual action)
-20.0-50.0% of proportional band value (**Default: 0**).
Negative indicates dead band value.
Positive means overlap.

53 *c.o.t.c.* Cooling Cycle Time

Cycle time for cooling output
1-300 seconds, Default: 10.

54 *c.F.L.t.* Conversion Filter

ADC Filter: Number of input sensor readings to calculate the mean that defines process value. **NB:** When readings increase, control loop speed slows down

<i>d.S.</i>	Disabled
<i>2.S.n.</i>	2 Samples Mean
<i>3.S.n.</i>	3 Samples Mean
<i>4.S.n.</i>	4 Samples Mean
<i>5.S.n.</i>	5 Samples Mean
<i>6.S.n.</i>	6 Samples Mean
<i>7.S.n.</i>	7 Samples Mean
<i>8.S.n.</i>	8 Samples Mean
<i>9.S.n.</i>	9 Samples Mean
<i>10.S.n.</i>	10 Samples Mean (Default)
<i>11.S.n.</i>	11 Samples Mean
<i>12.S.n.</i>	12 Samples Mean
<i>13.S.n.</i>	13 Samples Mean

14.S.n. 14 Samples Mean

15.S.n. 15 Samples Mean

55 *c.F.r.n.* Conversion Frequency

Sampling frequency of analogue / digital converter.

NB: Increasing the conversion speed will slow down reading stability (example: for fast transients, as pressure, it is advisable to increase sampling frequency)

<i>242H.</i>	242 Hz (Maximum speed conversion)
<i>123H.</i>	123 Hz
<i>62 H.</i>	62 Hz
<i>50 H.</i>	50 Hz
<i>39 H.</i>	39 Hz
<i>33.2H.</i>	33.2 Hz
<i>19.6H.</i>	19.6 Hz
<i>16.7H.</i>	16.7 Hz (Default) Ideal for filtering noises 50 / 60 Hz
<i>12.5H.</i>	12.5 Hz
<i>10 H.</i>	10 Hz
<i>8.33H.</i>	8.33 Hz
<i>6.25H.</i>	6.25 Hz
<i>4.17H.</i>	4.17 Hz (Minimum speed conversion)

56 *u.F.L.t.* Visualization Filter

Slow down the refresh of display, to simplify reading

Disabled with pitchfork (maximum speed of display update) **Default.**

<i>F.i.o.r.</i>	First order filter with pitchfork
<i>2.S.n.</i>	2 Samples Mean
<i>3.S.n.</i>	3 Samples Mean
<i>4.S.n.</i>	4 Samples Mean
<i>5.S.n.</i>	5 Samples Mean
<i>6.S.n.</i>	6 Samples Mean
<i>7.S.n.</i>	7 Samples Mean
<i>8.S.n.</i>	8 Samples Mean
<i>9.S.n.</i>	9 Samples Mean
<i>10.S.n.</i>	10 Samples Mean (Maximum slow down of display update)
<i>n.u.L.L.</i>	Disabled without pitchfork
<i>F.o. 2</i>	First order filter

57	<i>tunE</i>	Tune
		Tuning type selection. (See paragraph 7.2)
	<i>d iE.</i>	Disabled (Default)
	<i>Auto</i>	Automatic (P.I.D. parameters are calculated at activation and at change of set point)
	<i>MAN.</i>	Manual (launch by keyboard or digital IN)
	<i>SYnc.</i>	Synchronized [see word modbus 1025 (only UR484803)

58	<i>S.dE.u.</i>	Setpoint Deviation Tune
		Select the deviation from the command setpoint for the threshold used by autotuning to calculate the P.I.D. parameters
		0-5000 [digit ¹⁰] (degrees.tenths for temperature sensors),
		Default: 10.

59	<i>oP.No.</i>	Operating Mode
		Select operating mode. (See paragraph 7.12)
	<i>cont.</i>	Controller (Default)
	<i>Pr.cY.</i>	Pre-programmed cycle (See paragraph 7.7)
	<i>2t.S.</i>	Setpoint change by digital input
	<i>2t.S. i.</i>	Setpoint change by digital input with impulse command
	<i>3t.S. i.</i>	3 sets change by digital input with impulse command
	<i>4t.S. i.</i>	4 sets change by digital input with impulse command
	<i>t.rES.</i>	Reset time (custom function)
	<i>P.c.S.S.</i>	Pre-programmed cycle with Start / Stop by digital input

60	<i>Auto.MA.</i>	Automatic / Manual
		Enable automatic / manual selection. (See paragraph 7.6)
	<i>d iS.</i>	Disabled (Default)
	<i>En.</i>	Enabled
	<i>EnSt.</i>	Enabled with programming module

61	<i>dGE. i.</i>	Digital Input
		Digital input functioning (P59 selection must be <i>cont.</i> or <i>Pr.cY.</i>). (See paragraph 7.2)
	<i>d iS.</i>	Disabled (Default: 0)
	<i>St.St.</i>	Pre-programmed cycle with Start / Stop
	<i>run.o.</i>	Run N.O. (enables regulation with N.O. contact)
	<i>run.c.</i>	Run N.C. (enables regulation with N.C. contact)
	<i>L.c.n.o.</i>	Lock conversion N.O. (stop conversion and display value with N.O.)
	<i>L.c.n.c.</i>	Lock conversion N.C. (stop conversion and display value with N.C.)
	<i>tunE</i>	Manual Tune (by digital input)
	<i>MAN. i.</i>	Auto manual impulsive (See paragraph 7.12)
	<i>MAN.c</i>	Automatic manual contact (See paragraph 7.12)

62	<i>GrAd.</i>	Gradient
		Rising gradient for Soft-Start or pre-programmed cycle
		0 Disabled
		1-9999 [Digit/hour ¹¹] (degrees/hour with display of tenth for temperature sensor)
		Default: 0.

63	<i>MA.t. i.</i>	Maintenance Time
		Maintenance time for pre-programmed cycle
		00.00-24.00 hh.mm. Default: 00.00

64	<i>u.M.c.P.</i>	User Menu Cycle Programmed
		Allows to modify rising gradient and maintenance time, from user menu, when pre-programmed cycle is operating
	<i>d iS.</i>	Disabled (Default)
	<i>GrAd.</i>	Gradient
	<i>MA.t. i.</i>	Maintenance time
	<i>ALL</i>	Both gradient and maintenance time

¹⁰ Display of decimal point depends on setting of parameter *SEn.* and parameter *d.P.*

¹¹ Display of decimal point depends on setting of parameter *SEn.* and parameter *d.P.*

65 *u.Lt.* Visualization Type

Select visualization for display 1 and 2

- 1.P.2.S.* 1 Process, 2 Setpoint (**Default**)
- 1.P.2.H.* 1 Process, 2 Hide after 3 sec.
- 1.S.2.P.* 1 Setpoint, 2 Process
- 1.S.2.H.* 1 Setpoint, 2 Hide after 3 sec.
- 1.P.2.A.* 1 Process, 2 Ampere (T.A. input)
- 1.P.2.* 1 Process, 2 Command output percentage

66 *dEGr.* Degree

Select degree type

- °C* Centigrade (**Default**)
- °F* Fahrenheit

67 *rEtr.* Retransmission

Retransmission for output 0-10 V or 4...20 mA (select Jumpers JP5, JP7 and JP9). Parameters 68 and 69 define the lower and upper limits of the scale.

- d .S.* Disabled
- uo. P.* Retransmits process in Volt
- mA. P.* Retransmits process in mA
- uo. c.* Retransmits command setpoint in Volt
- mA. c.* Retransmits command setpoint in mA
- uo.o.P.* Volt output percentage
- mA.o.P.* mA output percentage
- uo.A. 1* Volt alarm 1 setpoint
- mA.A. 1* mA alarm 1 setpoint
- uo.A. 2* Volt alarm 2 setpoint
- mA.A. 2* mA alarm 2 setpoint
- uo.t.A.* Volt T.A.
- mA.t.A.* mA T.A.

68 *Lo.Lr.* Lower Limit Retransmission

Output V / mA retransmission lower limit range

-999...+9999 [digit¹²] (degrees.tenths for temperature sensors),
Default: 0.

69 *uP.Lr.* Upper Limit Retransmission

Output V / mA retransmission upper limit range

-999...+9999 [digit¹²] (degrees.tenths for temperature sensors),
Default: 1000.

70 *bdr.t.* Baud Rate

Selects baud rate for serial communication

- 4.B t* 4.800 Bit/s
- 9.6 t* 9.600 Bit/s
- 19.2t* 19.200 Bit/s (**Default**)
- 28.8t* 28.800 Bit/s
- 39.4t* 39.400 Bit/s
- 57.6t* 57.600 Bit/s

71 *SLAd.* Slave Address

Selects slave address for serial communication

1 – 254. Default: 254

72 *SE.dE.* Serial Delay

Select serial delay

0 – 100 milliseconds. Default: 20

73 *LL.o.P.* Lower Limit Output Percentage

Selects min. value for command output percentage

0 – 100%, Default: 0%.

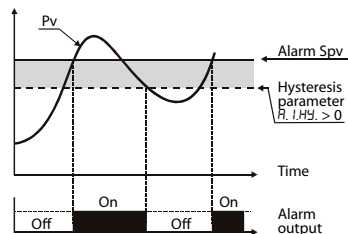
Ex: with *o.out* selected as 0...10 V and *LL.o.P.* set at 10%, command output can change from a min. of 1 V to a max. of 10 V.

¹² The display of the decimal point depends on the setting of parameter *SEn.* and the parameter *d.P.*

11 Alarm Intervention Modes

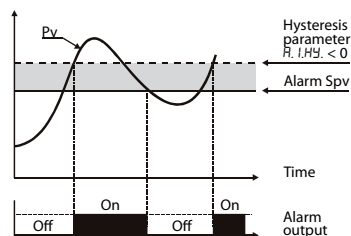


Absolute Alarm or Threshold Alarm (A. AL. selection)



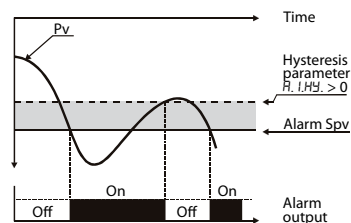
Absolute alarm with controller in heating functioning (par. 11 *Act.L.* selected *HEAT*) and hysteresis value greater than "0" (par. 28 *R. I.HY.* > 0).

NB¹³



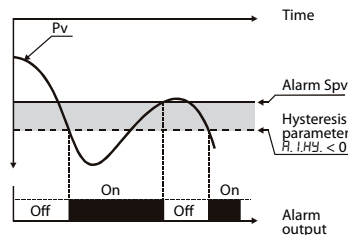
Absolute alarm with controller in heating functioning (par. 11 *Act.L.* selected *HEAT*) and hysteresis value less than "0" (par. 28 *R. I.HY.* < 0).

NB¹³



Absolute alarm with controller in cooling functioning (par. 11 *Act.L.* selected *COOL*) and hysteresis value greater than "0" (par. 28 *R. I.HY.* > 0).

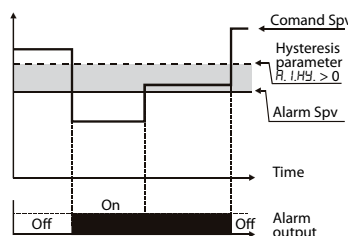
NB¹³



Absolute alarm with controller in cooling functioning (par. 11 *Act.L.* selected *COOL*) and hysteresis value less than "0" (par. 28 *R. I.HY.* < 0).

NB¹³

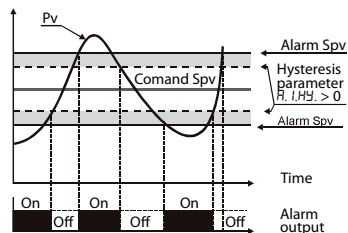
Absolute Alarm or Threshold Alarm Referring to Setpoint Command (A.C.AL. selection)



Absolute alarm refers to the command set, with the controller in heating functioning (par. 11 *Act.L.* selected *HEAT*) and hysteresis value greater than "0" (par. 28 *R. I.HY.* > 0). The command set can be changed by pressing the arrow keys on front panel or using serial port RS485 commands.

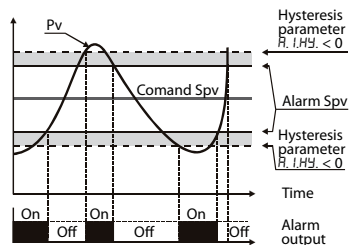
NB¹³

Band Alarm (b. AL. selection)



Band alarm hysteresis value greater than "0" (par. 28 *R. I.HY.* > 0).

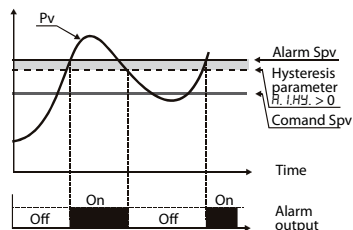
NB¹³



Band alarm hysteresis value less than "0" (par. 28 $R.I.HY. < 0$).

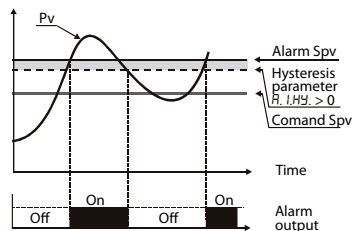
NB¹³

Upper Deviation Alarm (H.d.AL. selection)



Upper deviation alarm value of alarm setpoint greater than "0" and hysteresis value greater than "0" (par. 28 $R.I.HY. > 0$).

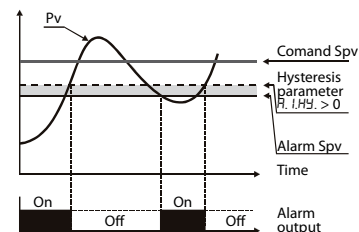
NB¹⁴



Upper deviation alarm value of alarm setpoint less than "0" and hysteresis value greater than "0" (par. 28 $R.I.HY. > 0$).

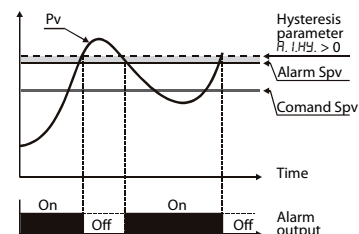
NB¹⁴

Lower Deviation Alarm (L.d.AL. selection)



Lower deviation alarm value of alarm setpoint greater than "0" and hysteresis value greater than "0" (par. 28 $R.I.HY. > 0$).

NB¹⁴



Lower deviation alarm value of alarm setpoint less than "0" and hysteresis value greater than "0" (par. 28 $R.I.HY. > 0$).

NB¹⁴

¹³ The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.

¹⁴ a) The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.

b) With hysteresis value less than "0" ($R.I.HY. < 0$) the broken line moves under the alarm setpoint.

12 Table of Anomaly Signals

If installation malfunctions, controller will switch off regulation output and will report the anomaly. For example, controller will report failure of a connected thermocouple visualizing *E-05* flashing on display for other signals, see table below.

	Cause	what to do
E-01 <i>555.E</i>	Error in EEPROM cell programming.	Call Assistance.
E-02 <i>555.E</i>	Cold junction sensor fault or room temperature outside of allowed limits.	Call Assistance.
E-04 <i>555.E</i>	Incorrect configuration data. Possible loss of calibration values.	Check if the configuration parameters are correct.
E-05 <i>555.E</i>	Thermocouple open or temperature outside of limits.	Check the connection with the sensors and their integrity.
E-08 <i>555.E</i>	Missing calibration data.	Call Assistance.

13 Summary of Configuration parameters

Date:

Model UR4848:

Installer:

System:

Notes:

<i>c.out</i>	Command output type selection
<i>SEn</i>	Analogue input configuration
<i>d.P.</i>	Number of decimal points
<i>Lol.S.</i>	Lower limit setpoint
<i>uPl.S.</i>	Upper limit setpoint
<i>Lol.L.</i>	Lower limit range AN1 only for linear
<i>uPl.L.</i>	Upper limit range AN1 only for linear
<i>LRtc</i>	Automatic setting of linear input limits
<i>o.cAL.</i>	Offset calibration
<i>G.cAL.</i>	Gain calibration
<i>Rct.t.</i>	Regulation type
<i>c. rE.</i>	Command output reset type
<i>c. SE.</i>	Contact state for command output in case of error
<i>c. Ld.</i>	Define the OUT1 led state
<i>c. HY.</i>	Hysteresis in ON / OFF or dead band in P.I.D.
<i>c. dE.</i>	Command delay
<i>c. SP.</i>	Command setpoint protection
<i>P.b.</i>	Proportional band
<i>t. i.</i>	Integral time
<i>t.d.</i>	Derivative time
<i>t.c.</i>	Cycle time
<i>o.PoL.</i>	Upper limit of heating output percentage
<i>AL. 1</i>	Alarm 1 selection
<i>R. i.S.o.</i>	Alarm 1 output contact and intervention type
<i>R. IrE.</i>	Reset type of alarm 1 contact
<i>R. i.S.E.</i>	State of contact for alarm 1 output
<i>R. i.L.d.</i>	State of OUT2 led

<i>A.1.HY</i>	Alarm 1 hysteresis
<i>A.1.dE.</i>	Alarm 1 delay
<i>A.1.S.P.</i>	Alarm 1 set protection
<i>AL. 2</i>	Alarm 2 selection
<i>A.2.S.o.</i>	Alarm 2 output contact and intervention type
<i>A.2.rE</i>	Reset type of alarm 2 contact
<i>A.2.S.E.</i>	State of contact for alarm 2 output
<i>A.2.L.d.</i>	State of OUT2 led
<i>A.2.HY.</i>	Alarm 2 hysteresis
<i>A.2.dE.</i>	Alarm 2 delay
<i>A.2.S.P.</i>	Alarm 2 set protection alarm 2 set protection
<i>AL. 3</i>	Alarm 3 selection
<i>A.3.S.o.</i>	Alarm 3 output contact and intervention type
<i>A.3.rE.</i>	Reset type of alarm 3 contact
<i>A.3.S.E.</i>	State of contact for alarm 3 output
<i>A.3.L.d.</i>	State of OUT3 led
<i>A.3.HY.</i>	Alarm 3 hysteresis
<i>A.3.dE.</i>	Alarm 3 delay
<i>A.3.S.P.</i>	Alarm 3 set protection
<i>t.A.</i>	Activation and scale range of Current transformer
<i>L.b.A.t.</i>	Intervention threshold of Loop Break Alarm
<i>L.b.A.d.</i>	Delay time for Loop Break Alarm intervention
<i>c.o.o.F.</i>	Cooling fluid type
<i>P.b.Π.</i>	Proportional band multiplier
<i>o.u.d.b.</i>	Overlapping / Dead band
<i>c.o.t.c.</i>	Cycle time for cooling output
<i>c.F.L.t.</i>	Analog converter filter
<i>c.F.r.n.</i>	Sampling frequency of analog converter
<i>u.F.L.t.</i>	Display filter
<i>t.unE</i>	Autotuning type selection
<i>S.d.t.u.</i>	Command setpoint deviation for tuning threshold
<i>o.P.Π.o</i>	Operating mode

<i>A.u.Π.A.</i>	Automatic / manual selection
<i>dG.t. i.</i>	Digital input functioning
<i>G.r.A.d.</i>	Gradient for Soft-Start
<i>Π.A.t. i.</i>	Cycle maintenance time
<i>u.Π.c.P.</i>	Gradient change and maintenance time by user
<i>u.i.t.Y.</i>	Display data selection
<i>dE.G.r.</i>	Degree type selection
<i>r.E.t.r.</i>	Retransmission for output 0-10 V or 4...20 mA
<i>L.o.L.r.</i>	Lower limit range for linear output
<i>u.P.L.r.</i>	Upper limit range for linear output
<i>b.d.r.t.</i>	Select baud rate for serial communication
<i>S.L.A.d.</i>	Select slave address
<i>S.E.dE.</i>	Select the serial delay
<i>L.L.o.P.</i>	Lower limit of heating output percentage

Notes / Updates

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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